35. A Report on the Fauna of the Monte Bello Islands.

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[Received March 18, 1914 ; Read June 9, 1914.]

(Plates I.–IV.†)

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Off the coast of Western Australia, from the North-West Cape to Port Walcott, there stretches an archipelago of small desert islands, the zoology of which has been but little investigated. Lying as they do, in a shallow sandy sea, and for the most part in sight of the low shores and mangrove-swamps of the mainland, it is unlikely that their fauna should exhibit any marked insular characters, but they offer great opportunities of considering the typical forms which inhabit them in relation to their somewhat peculiar environmental conditions. Of all these islands the Monte Bello Group is the most isolated, and so from its position the most likely to repay investigation.

Mr. T. H. Haynes, a gentleman engaged in experimenting upon the artificial cultivation of Pearl Oysters, was for some time living upon these islands, and in his leisure collected various zoological specimens, which he sent to the British and West Australian Museums. His house was subsequently wrecked by a cyclone, and he was obliged to abandon his investigations. Since many of Mr. Haynes' specimens presented features of interest, Mr. Bernard Woodward, Director of the West Australian Museum, thought it desirable that the group should be thoroughly investigated, and a grant was offered for the purpose. As this was insufficient a special application was made to the Royal Society, resulting in a further grant of £50. These grants

* Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.Z.S.

† For explanation of the Plates see p. 652.

enabled the writer, accompanied by Mr. L. Burns, of Perth, W.A., as assistant, to spend from May 29th to August 29th, 1912, collecting upon the islands. Mr. Burns has since been drowned while duck-shooting at the Forrest River, near Wyndham. He was a very able collector and a delightful companion.

I must here acknowledge the very great assistance received from Professor Stanley Gardiner at home, from Mr. Woodward and Mr. W. B. Alexander in Western Australia, and from Mr. Gregory Mathews and workers in various departments of the British Museum (Natural History), who have so kindly helped in identifying the specimens.

A detailed description of a local fauna is incomplete without some account of its environment; it is therefore necessary to consider the prevailing physical conditions and geographical features of the locality before proceeding to an account of the various forms inhabiting it.

The group lies approximately in lat. 20° 25′ S., long. 115° 30′ E., 105 miles E.N.E. of North-West Cape, and 40 miles from the mouth of the Fortescue River—the nearest point on the mainland. It is near this latitude that the rainfall on the West Australian coastal region reaches its minimum, averaging under 8 inches per annum; it is of very irregular occurrence, droughts of two or even three consecutive years being not infrequent. The rain falls in the summer, usually in January or February, and is frequently attended by a particularly severe form of cyclone known locally as a "Willi-willi." These storms strike the West Australian coast between latitudes 18° and 23°, and cause much destruction to buildings and shipping. Their wind velocity has never been accurately measured, but lines of short iron telegraph-poles bent in the middle through as much as 45° testify to the force attained. Cyclones may occur between November and March; from mid-April until October, comparatively calm and dry weather may be depended upon. During these months there are occasional winter showers, which become more frequent and regular further from the coast. Hence the islands are favoured with a slightly higher rainfall, and the vegetation is in consequence a little more luxuriant and less scattered than that of the mainland in the corresponding latitude. Though these showers are refreshing when they do occur, they are really very scanty, and contribute but little to the average, for the bulk of the rain falls in one or more tropical downpours during the course of a few hours.

The temperature is not excessive; during our visit the shade temperature at mid-day averaged 82·3°, never rising above 90·0° F.

The geological formation throughout is of sandy post-tertiary limestone, similar to that of the mainland, which extends in an interrupted belt down the greater length of the west coast of the continent, and is supposed to have accumulated by wind-action.

The Monte Bello rock is comparatively poor in Foraminifera, but contains numerous fragments of broken shell. Most of the lime is concentrated near the surface, and the bare hill-tops on Hermite Island are covered in places with an extremely dense and hard marble-like surface deposit, only a few inches in thickness, formed by rapid surface-evaporation drawing up the water from the lower levels and depositing its mineral contents.

The main geographical features of the group are indicated on any map. It lies at the northern extremity of an extensive shoal, which stretches in a southerly direction to within fifteen miles of the mouth of the Robe River, including Barrow, a comparatively large island lying twelve miles S. by S.W. of the Monte Bello Group. The southern portion of this shallow area, known as Barrow Island Shoals, has soundings of $2\frac{1}{2}$ fathoms, and dries in patches at low water. This closely approaches another bank, which lies between the mouths of the Cane and Robe rivers, including the Mary Anne Islands. The passage between these shoals is only four miles wide, and nowhere more than nine fathoms in depth. Half encircling the Monte Bello Group on the north and west sides is Breakin's Reef, which is the actual limit of the bank. It is not a coral formation, although there are plenty of corals upon it, and it dries in patches at low water with the spring tides. Outside the 'reef' soundings of 40–50 fathoms are struck almost immediately. It seems likely that this shallow area at one time formed an extensive triangular cape, of which the Monte Bello Islands formed the northern extremity, having become separated at a comparatively recent period. Barrow Island was probably connected with the Monte Bello Islands long after its separation from the mainland, a supposition supported by zoological evidence hereafter to be dealt with.

It will be well now to describe the respective characters of the two main islands, Hermite and Trimouille.

Hermite Island, the largest and most fertile, measures rather over six miles from N. to S., and about one and three-quarters across at its widest part. The coast-line is irregular, and extensive shallow inlets run far inland amongst low undulating hills, nearly dividing the island longitudinally into an Eastern and a Western portion. The coasts facing the open sea are rocky and irregular, with low rugged cliffs and stony beaches; but the shores of the inlets are regular and characteristic, the hills sloping down to a flat rocky terrace, which is bare of vegetation and washed by the sea at very high tides in windy weather. This terrace descends nearly perpendicularly to the regular tidal flat, and its edge is much undercut, owing to the tides which flow swiftly up and down the long and narrow inlets, and to the absence of big seas, which would break up the configuration. Since these inlets are locally called 'lagoons,' I shall continue to speak of them as such, though they have nothing to do with the true lagoons associated with coral formations. In the sheltered

bays and inlets, there are growths of 'mangrove' comprising an *Avicennia*, which grows to a considerable size and forms a belt of varying width skirting the sandy flats just below high-water mark. Further out in the lagoon, the *Avicennia* gives place suddenly to a true mangrove of the genus *Bruguiera*, which forms another zone, and at the head of the large lagoon extends right across to the *Avicennia* belt along the opposite shore.

The highest point on the island is 180 feet above sea-level. Though the hills and ridges are low, their slopes are steep, with much bare and weathered rock showing between the scanty vegetation. The level plains are covered with a light, sandy, red soil, very fertile when sufficiently watered. The vegetation is of a type known collectively as '*Spinifex*-scrub,' which covers large tracts of north-western Australia. *Spinifex* is the predominant plant over most areas; it grows in dense prickly tufts and patches, in some places the shrubs so close together that walking amongst them is a tortuous and somewhat painful business. Next in abundance to the *Spinifex* is *Myoporum acuminatum*, a shrub with bright green foliage and small white flowers, very attractive to Lycænid butterflies. An *Olearia* is also common; it is a tall and wiry shrub, with insignificant flowers, and small and rather scanty linear leaves, giving little cover. The branches generally bear the large cobwebs of a big and handsome spider, *Nephyla meridionalis*. Of the less abundant shrubs must be mentioned a *Cassia*, apparently near *C. oligrelada*, and a species of *Croton* (Euphorbiaceæ), a coarse, rough bush, generally affecting the upper slopes of the ridges. Characteristic of the areas along the shores may be mentioned a Chenopodiaceous plant, *Rhagodia billardieri* R. Br., forming a bush of moderate proportions with clusters of inconspicuous green flowers, attractive to insects. The almost universally distributed *Salsola kali*, Linn., occurs abundantly, and *Frankenia pauciflora* grows commonly on the limestone rocks, around the sheltered lagoons being seen in isolated patches almost down to the water's edge. Of the more abundant herbaceous plants may be mentioned *Tricholesma zeylanicum* R. Br., which usually stands alone or in loose clusters on bare patches of soil, its bright blue flowers very conspicuous. A species of *Senecio* is also rather common, remarkable in that it usually forces its way up through dense patches of *Spinifex*.

This brief account of the characteristic vegetation applies only after a period of drought, such as there had been previous to our visit to the islands. A good shower had fallen in April 1912, but it was in all probability insufficient to bring up the majority of the herbaceous annuals, which are short-lived, and flourish only for a month or two after the heavy tropical rains. At such times the island may present a different aspect.

There is no surface-water on Hermite—or in fact, on any of the islands—during the dry season; our water-supply was derived from a well, which had been sunk for fifteen feet through the porous rock, and which yielded us a permanent though scanty

supply. After the rains, water may be obtained from surface-diggings in the sand-hills situated to the west side of the island.

Trimouille in many respects differs markedly from Hermite Island. The coast-line is far more regular, and there is but one inlet. This is quite unlike the lagoons of Hermite, for there are no rocky margins, and the dunes rise directly from shores of white sand. It forms, in fact, a more or less circular bay, with a narrow entrance. From the south side there runs off a tidal creek, around which there is a considerable growth of mangrove, but the *Avicennia* and *Bruguiera* are intermixed, and do not form separate zones. The vegetation here is also peculiar, consisting almost entirely of Chenopodiaceous plants comprising both shrubs and herbs, mostly of the genus *Atriplex*, *A. isatidea* Moq. covering large areas of the sandy foreshore.

This particular spot is the chief haunt of a small bird, *Zonœginthus castanotis roebucki*, which though widely distributed on the mainland, is in the Monte Bello Group confined to Trimouille, though individuals occasionally cross over to South-East Island, which lies off its south-eastern end. (See p. 636.)

Nearly the whole of Trimouille is covered with blown sand, which towards the north-western end has collected into dunes of considerable size, two of which are particularly prominent, the largest rising to a height of 120 feet. At the foot of this hill, fresh water can be permanently obtained by shallow digging. The sand at the south-eastern extremity of the island is very coarse in texture, almost gravel, becoming gradually finer towards the north-western end. This sifting effect, due to the wind, was possibly of only a temporary nature, the result of a recent gale.

As might be anticipated, the vegetation is far less luxuriant and more scattered than on Hermite Island, though it is quite as varied. *Spinifex* is much in evidence, and on the sand-hills facing the sea one frequently meets with the widely-distributed *Ipomœa pes-caprœ*, growing in a form with immensely long trailing stems, with erect tufts of glossy green leaves and pink flowers, separated by internodes as much as 20 feet in length. *Tribulus cistoides* Linn., *Boerhaavia diffusa* Linn., and *B. repanda* are all common, the latter often trailing up over the shrubs like a regular climber, though it grows equally well alone.

Of the smaller islands little need be said, for they embody to a greater or lesser extent characteristics already described. There is quite a varied flora on some of the smallest outlying islets, for the soil has an extra fertility imparted to it by the 'mutton-birds,' which breed in large numbers in burrows in the sand and holes in the rocks.

In the following survey of the animals represented, stress has been laid upon small differences which may indicate zoological isolation, and trinomials have been adopted wherever it was thought desirable, but only where the series show uniformity.

Owing to the general scarcity of life, in consequence of the arid conditions prevailing, it was often not possible to get a really sufficient number of specimens. Particularly in the case of insects, the matter is complicated by the fact that, where there is no great abundance of individuals, any collected at the same time and place are liable to be of the same brood. Thus all may exhibit a slight peculiarity, and give a false impression of uniformity in a character which may really be quite exceptional.

MAMMALIA.

There are now two indigenous animals inhabiting these islands, a Hare Wallaby, *Lagorchestes conspicillatus* (Gould)*, and a Bat, *Eptesicus pumilus* Gray. There was formerly a Bandicoot, *Isoodon barrowensis* Thom., which until very recently inhabited Hermite Island, but has now been exterminated.

Of introduced species, cats and black rats (*M. rattus rattus*) are numerous, and, as in other places, doing great damage to the endemic fauna. The brown rat (*M. decumanus*) has already established itself in a store-shed used by one of the pearling fleets, but it does not appear to be thriving, for all the examples observed were in a weak and diseased condition.

1. Lagorchestes conspicillatus (Gould).

This species is closely allied to the more slender and agile rufous-coloured "subspecies" *L. c. leichardti*, which is widely distributed over tropical Australia. It is now confined to Hermite and Barrow Islands, and Mr. Oldfield Thomas, who has kindly identified the species, can detect no difference between examples from the two localities. There is a specimen in the British Museum, a co-type from the Gould collection, which is recorded as having been obtained from "Trimouille I., Dampier Archipelago." It is more than likely that this is a Monte Bello example, for there is no island of that name in the Dampier Archipelago, and on some of the older charts the Monte Bello Group is represented by a single island named Trimouille. Whether it actually came from Trimouille, and not from Hermite Island, it is impossible to decide, but at the present time the species lives only on the latter, though old pearlers say that it was formerly abundant on the former. The majority of known specimens are from Barrow Island, where the species still occurs; I am aware of no other locality.

In habits it is nocturnal, hiding by day amongst the thick *Spinifex*-tufts, and coming out just after sunset to feed upon the bark and young shoots and foliage of various herbs and bushes. It is unlikely that it will exist for many years longer, as

* The parentheses around the names of authors placed after scientific names in this paper are used in accordance with Article 23 of the International Rules of Nomenclature (Proc. 7th Int. Cong. Boston, 1907, p. 44 (1912)).—Editor.

it is one of the most defenceless animals that can well be imagined. It is easily dislodged from its hiding-place amongst the *Spinifex*, from which it often rises in an awkward fashion, tripping up and rolling over before getting away. Though it is able to hop swiftly for a short distance, it rapidly becomes exhausted, and is not difficult to obtain by simply running after it and catching it by the tail.

The breeding-season appears to be during the summer and is possibly dependent upon the rains, for we saw no half-grown specimens, and as the rains of the previous summer had failed, they may not have bred at all. It is possible, however, that the cats had accounted for all the young ones. The pouches of all the females were empty, but in the middle of August males and females were often seen in pairs.

The species under consideration offers a very striking example of "degeneration" resulting from isolation and consequent absence of enemies. Owing to the lack of surface-water upon these islands, it has never had to face the dingo and the aborigines, who would make short work of an animal so easily caught. It is remarkable that it has been able to brave the climatic conditions for so long, and has not succumbed to a particularly severe drought or cyclone. The identity of this species with that of Barrow Island indicates a comparatively recent land-connection, but from all the other smaller islands, which presumably formed part of the same land-mass, the species has disappeared.

2. Isoodon barrowensis Thom.

Only shrivelled skins and bones of this species were discovered, but skulls correspond in all essentials with specimens from Barrow Island, with which it is in all probability identical. The cats have evidently been responsible for its extermination. Its distribution corresponds exactly with that of the species last described, and here again it is quite distinct from the corresponding mainland form.

3. Eptesicus pumilus Gray.

This little bat occurs on the North-West Australian mainland, and is not uncommon over the whole Monte Bello Group, appearing upon the wing about sunset. It was generally observed near rocks and cliffs, where it probably spends the day.

Introduced species.—It is curious to find *Mus rattus* particularly common on the small outlying islands of the group which have never been inhabited, frequenting the beaches and sand-hills near the coast. It occurs on practically every island, and its presence is attributed to a pearling-schooner which was wrecked some twenty years ago. All the specimens we obtained were

well-grown examples of typical *M. rattus*, with long black fur and dark grey underparts—not the brown, light-bellied var. *alexandrinus* which is more usually found in such situations. They appeared to feed upon small crabs on the shores between the tide-marks, and to derive their water-supply from gnawing the stems and leaves of succulent plants. Their tracks were very noticeable on the sand-hills, in some places forming well-worn paths, which usually led to holes in the rocks, where they breed.

The cats which have been introduced into Hermite Island appear to be breeding rapidly; wherever introduced they soon become exceedingly shy and wary, and grow to a very large size. They will, no doubt, in a few years time have accounted for the wallabies, as they have for the bandicoots. If they cannot kill a full-grown wallaby—though I am inclined to believe they do—they make short work amongst the young ones.

AVES.

In the following notes, the nomenclature adopted is that of Mr. Gregory Mathews, to whom I am greatly indebted for his very kind assistance in identification. The numbers after the names given in the notes on the different species refer to Mathews' "Reference List of the Birds of Australia," 1912.

LAND BIRDS.

1. Geopelia humeralis headlandi. 50 b. Pale Barred-shouldered Dove.

Compared with the type, these birds agree in all necessary detail. The species frequents the more bushy parts of the islands, feeding upon fallen berries and seeds. They roost and nest in the mangroves, constructing a loose platform of sticks amongst the branches, upon which two white eggs are laid. The nesting-season is dependent upon the rains, occurring usually in January or February, but after a shower of rain on July 8th, 1912, the males at once began to show signs of courtship, and by the end of the month a small percentage of the birds were breeding.

Individuals were nearly always to be seen around the well and an abandoned water-tank containing brackish water, into which they used to fly to drink and bathe. The problem at once suggests itself as to how they fared before these tanks were built. The dews are usually heavy, and the smaller birds were sometimes observed drinking the dew-drops from the bushes in the early morning, but, when the easterly winds are blowing, this source fails entirely for days in succession. The only other species which frequented artificial water-supplies is the little "finch," *Zonæginthus castanotis roebucki*, which visited the "well" on Trimouille in flocks. Although at the time of our arrival the well was choked, and several inches of material had

to be removed before any water collected at all, yet the damp sand was pitted and scored all over the surface by the beaks of birds.

The distribution of this dove ranges from about Sharks Bay to the mouth of the Shaw River.

♂: wing 137 mm.; culmen 18; tarsus 21·5.
♀ „ 125–7 mm.; „ 17; „ 20.

Iris orange-red; bill dark slate-colour; feet salmon-pink, claws black.

2. Halcyon sanctus westralasianus. 557. Western Sacred Kingfisher.

Halcyon westralasianus Campbell, Emu, vol. i. p. 25, 1901.

One specimen, not fully adult, agrees with specimens from S.W. Australia rather than with *H. s. ramsayi* Mathews, from the N.W. of the continent. The specimen was shot in its haunts among the mangroves, where it did not seem to be at all common.

♀ (immature): wing 90 mm.; culmen 36; tarsus 12.

Iris brown; bill slaty black, pale at base of lower mandible; feet brown, claws black.

3. Halcyon sordidus melvillensis. 560 a. Northern Mangrove Kingfisher.

Mathews, Austral Avian Record, vol. i. p. 38, 1912.

Two immature examples agree in size and general appearance with birds from Melville Island. The specimens were obtained amongst the thick mangroves of Hermite.

♀ (immature): wing 97 mm.; culmen 49; tarsus 13.

Iris brown; bill slaty black, pale at base of lower mandible; feet brown, claws black.

4. Chrysococcyx basalis wyndhami. 586. Western Narrow-billed Bronze Cuckoo.

Five examples of this bird, from the unbarred immature form to the fully adult, agree with the western bird described by Mathews. The species was found only upon Hermite, where it is not uncommon, especially in the dense mangrove-forest at the head of the Large Lagoon. It is a shy bird, but usually betrays its presence by its shrill note—a clear whistle several times repeated.

♂ (adult): wing 104 mm.; culmen 12; tarsus 18.
♀ (adult): „ 97 mm.; „ 12; „ 17.

Iris dull orange-red; culmen dark brown; feet brown.

Young: iris grey.

5. Pachycephala rufiventris colletti. 698 a. Northern Thickhead.

Mathews, Austral Avian Record, vol. i. p. 41, 1912; Parry's Creek, North-West Australia.

An immature male resembles the north-western bird described by Mathews as above.

The specimen was shot late in June. It was in company with several others of the same species, but, before or after that date, no others were seen. It is probably a casual visitor to the islands.

♂ (immature): wing 91 mm.; culmen 13; tarsus 20.

Iris brown; culmen light brown, dark at tip; feet dark brown.

6. Epthianura tricolor distincta. 845. Northern Tri-coloured Chat.

One male example has a much darker back than the type of the above bird; darker, indeed, than any specimens examined, but the species is variable in this respect.

The species occurs very sparingly upon Hermite; only two examples were observed, frequenting the thick bushy localities on the east of the island.

♂: wing 69 mm.; culmen 13·5; tarsus 19·5.

Iris brown; culmen dark brown; feet dark brown.

7. Eremiornis carteri assimilis. Island Desert Bird.

Montague, Austral Avian Record, vol. i. p. 181, 1913.

Differs from *E. c. carteri* in its smaller size, proportionately larger bill, and in the colour of the head, which is of a deeper and richer chestnut-brown.

The mainland representative (*E. c. carteri*) is a somewhat scarce bird inhabiting the *Spinifex*-country in the region of North-West Cape. The Monte Bello form is found principally upon the *Spinifex*-plains of Hermite, where it is rather common. It frequents the low scrub, slipping with ease and rapidity amongst the very thickest and most prickly bush, making good use of its long tail to guide and balance itself in so doing. Occasionally it will appear for an instant at the summit of a bush or tuft, utter a harsh clucking note, and disappear almost immediately, or make a short and hurried flight to the next thicket.

♂: wing 60 mm.; culmen 12; tarsus 19·5.

♀: ,, 51 mm.; ,, 12; ,, 14.

Iris brown; culmen dark brown; tarsus brown.

8. Artamus leucorhynchus harterti. 992. Western White-rumped Wood-Swallow.

This bird belongs to the West Australian form described by Mathews. It was met with commonly upon all the islands, usually to be seen hawking insects upon the wing, or, towards the middle of the day, resting upright upon bare twigs or stumps, in parties of three or four to a dozen. It would often accompany us while walking over the plains, and catch insects as they were dislodged from the *Spinifex*.

9. Zosterops lutea balstoni. 1099. Carnarvon White-eye.

Zosterops balstoni Grant, Ibis, 1909, p. 663.

Specimens agree with the type of the above bird from Carnarvon, North-West Australia. The species is a small, dull-coloured form of *Zosterops lutea* Gould, though it would be more correct to look upon the type *lutea* as an island form of the far more widely distributed *balstoni*. It is much the most numerous bird inhabiting the Monte Bello Group, living upon all the islands, however small, where there is sufficient scrub to afford food and protection. It appears to be omnivorous in diet, feeding upon berries and seeds, and searching for insects amongst the foliage of the mangroves, in the vicinity of which it is always to be seen.

The nesting season is probably in October. In August, the males were in full song, and at the end of that month a half-constructed nest was discovered, suspended amongst the foliage of a dense *Bruguiera*, but it was not completed when I left.

♂: wing 57 mm.; culmen 9·5; tarsus 17.
♀: „ 56 mm.; „ 9·0; „ 17.
Iris brown; bill black; feet dark brown.

10. Stigmatops indistincta perplexa. 1201. Allied Least Honey-eater.

The specimens agree with birds from mid-Westralia. On the Monte Bello Islands the species was met with exclusively in the larger mangrove-forests of Hermite, frequenting the densest parts of the *Bruguiera*-zone. During July and August the males were in full song. The song is particularly pleasing, somewhat suggestive of that of the European Reed-Warbler, but more musical and less harsh. When singing amongst the dense and tangled vegetation the bird is extremely difficult to locate.

♂: wing 69 mm.; culmen 14·5; tarsus 20.
♀: „ 65 mm.; „ 14·0; „ 18.
Iris greyish brown; bill blackish brown; feet dark brown.

11. Anthus australis montebelli. Montebello Pipit.

Montague, Austral Avian Record, vol. i. p. 181, 1913.

This is a pale subspecies, in which the dark centres of all the feathers are much reduced, and the spotting on the breast is comparatively sparse. It lacks any rufous tinge.

This is a common bird over the whole group, being perhaps especially abundant upon Trimouille. It is the only species of land-birds which was observed to fly from island to island over passages more than two hundred yards across. It was met with everywhere on the open country, both on the rocky hill-slopes and on the sandy plains.

♂: wing 89 mm.; culmen 12; tarsus 24.
♀: „ 85 mm.; „ 12; „ 23.
Iris brown; bill black; feet light brown.

12. Zonæginthus castanotis roebucki. 1347. Dark Chestnut-eared Finch.

This bird resembles the form from Roebuck Bay in being dark above, and in having the dark ear-patch. The species in its various forms is widely distributed over the Australian continent. On the Monte Bello Group it is confined to Trimouille and South-East Island. Its head-quarters is the lagoon towards the north-west end of the island, which has already been described. Large, loose spherical nests, composed of dry herbaceous stems and lined with feathers and soft grass, were often to be met with amongst the branches of *Aricennia*, and one was found amongst the rocks under an overhanging cliff-edge. They contained no eggs; the breeding-season probably commences in October.

♂: wing 59 mm.; culmen 10; tarsus 14.
♀: „ 56 mm.; „ 9·5; „ 13·5.
Iris orange-red; bill orange; feet flesh-colour.

Land-birds alone are likely to furnish indications of zoological isolation and pre-existing land-connections. It will be seen that, with one exception, the above list only comprises birds which inhabit the North-West of Western Australia. The exception is *Halcyon sanctus westralasianus*, the subspecies inhabiting the South-Western region. The fact is of interest, as one would naturally have expected to find *H. s. ramsayi*, the North-Western bird, and the occurrence of South-Western forms on the Monte Bello Group is found also in the invertebrate fauna. Of the peculiar forms, *Eremiornis carteri assimilis* might have been anticipated, as it is a bird addicted to one locality and apparently incapable of prolonged flight. It has not been reported from Barrow Island, however, where there occurs in its stead a blue *Malurus*, which is absent from the Monte Bello Group. It is curious, on the other hand, that a bird so widely distributed and strong on the wing as *Anthus australis* should be also represented by a readily distinguished subspecies, whereas the *Zosterops*, a no less characteristic and abundant bird, of a genus quite remarkable for its insular forms, should be identical in every respect with the type from Carnarvon.

SEA-BIRDS, WADERS, AND BIRDS OF PREY.

13. Hydroprogne tschegrava strenua. 128. Caspian Tern.

Sylochelidon strenuus Gould, Proc. Zool. Soc. Lond., 1846.

This bird is distributed around the coasts of South and Western Australia, and was found in scattered pairs frequenting the low flat islets at the north of the group. A single half-grown young one was discovered among the rocks on a beach of Trimouille, at the end of July.

14. Bruchigavia novæ-hollandlæ longirostris. Silver Gull.

B. longirostris Masters, Proc. Linn. Soc. N. S. W., vol. ii. p. 113, 1877.

The range of the form extends from S.W. to N.W. Australia. Around the Monte Bello Islands it is not abundant; the whole of the north-western region is, in fact, remarkable for the comparative scarcity of sea-birds, in spite of the existence of extensive flats and shallows which ought to furnish an abundant food-supply.

A few old nests, apparently of this species, were found upon Long Island and several of the outlying rocks, and the breeding-season is said by the pearlers to be in December and January. The nesting-time of the gulls varies enormously and individually upon the various island groups around the West Australian coast, occurring, it would appear, any time between October and April.

15. Hæmatopus longirostris.

Fairly numerous around the sandy shores and mud-flats, feeding in small parties, often in company with the next species.

16. Hæmatopus unicolor ophthalmicus.

The Montebello Sooty Oystercatcher is the bird described as above, distinguished from *H. u. bernieri* by the bare orange-red space around the eyes. It is really a North Australian bird, and the Monte Bello Islands must be near the southern limit of its range, *H. u. bernieri* being the typical West Australian form.

17. Eupoda geoffroyi. 201. Large Sand Dottrel.

Charadrius geoffroyi Wagler, Syst. Av., Charadr. sp. 19, 1827; Java.

The distribution is from Southern Siberia southwards to Australia, where it occurs during summer, and in the northern part of which it has often been taken in full breeding plumage.

Observed in small numbers, usually feeding in company with *E. mongolus* and *C. ruficapillus* on the tidal flats of Hermite, throughout June, July, and August. The specimen obtained was shot on July 9th.

♂: wing 133 mm.; culmen 23; tarsus 33.

Bill dark brown; iris brown; feet dark brown, claws black.

18. Eupoda mongolus. 202. Mongolian Sand Dottrel.

Charadrius mongolus Pallas, Reise Russ. Reichs, vol. iii. p. 700, 1776; Mongolia.

The same remarks apply as to the former species.

♀: wing 129 mm.; culmen 17·5; tarsus 30.

19. Charadrius ruficapillus tormenti Mathews. 205. Pale Red-capped Dottrel.

Specimens agree with the above pale subspecies described by

Mathews; it is distinct from the eastern bird. It is distributed all along the coasts of Mid- and Western Australia and the Northern Territory.

Observed throughout June, July, and August; being seen generally on the tidal flats at low water, but flying about in flocks when the tide is high along the outer shores. Specimens were shot on June 10th and July 4th.

♂: wing 102–105 mm.; culmen 13·5; tarsus 25.

20. Pisobia minuta ruficollis. 230. Little Stint.

Trynga ruficollis, Pallas, Reise Russ. Reichs, vol. iii. p. 700, 1776; Siberia.

The same remarks apply as to *Eupoda geoffroyi* and *mongolus*. Specimens obtained on July 10th.

♂: wing 109 mm.; culmen 17·5; tarsus 17·5.
♀: „ 101 mm.; „ 16; „ 18.

21. Demiegretta sacra. Reef Heron.

This species was observed commonly, and both white and grey forms were seen, though only the latter, which is by far the most plentiful, was obtained. They were generally to be found about the rocks and cliffs of the outer shores, seldom frequenting the more sheltered inlets. A nest, containing three eggs, was discovered on a small flat islet to the north of Hermite. It formed a lining of loose sticks to a depression in the rock, a few feet above high-tide level. Only a yard or two away there was an Osprey's nest with newly-hatched chicks; although this bird will not tolerate another nest of its own species upon the same island, it does not in the least resent the presence of that of a different bird.

22. Pelecanus conspicillatus. New Holland Pelican.

Observed in small parties, usually of a dozen or so, around the islands to the north of the group. They do not breed in the vicinity.

23. Haliaëtus leucogaster Cuv. White-bellied Sea-Eagle. (Pl. III.)

This species, which enjoys a wide distribution, from the coasts of India, Ceylon, Malay Archipelago, and Australia to Western Polynesia and Tonga, occurs abundantly on the islands off North-Western Australia. Two pairs were nesting upon the Monte Bello Group, one at the extreme south-eastern end of Trimouille, and another on a small flat islet to the north of Hermite. The former nest was placed upon a sloping ledge of a cliff, and a great quantity of material was employed to bring the outer edge to the level of the inner portion; it was consequently a bulky structure, 5 ft. 6 in. in diameter—composed of sticks and seaweed, with no obvious cavity or lining—forming a safe and level platform for the single chick. In the second instance, there was practically

no nest, the single newly-hatched chick lying in a depression in the flat rock, into which had been placed a scanty collection of grass and sticks as a lining; here there was no danger of the egg or young bird falling out and being destroyed.

The species seems to subsist entirely upon fish and sea-snakes, never molesting the sea-birds (at least the adults), though the pair upon Trimouille were subject to violent attacks from a pair of Ospreys which were nesting upon a neighbouring rock. Whenever they were in the air together, the Ospreys would circle above the Eagle, screaming loudly, and then suddenly swoop down upon it. The latter bird would usually turn sharply sideways or almost upon its back, holding out its formidable talons and thus warning off its assailants, a feat of balance and flight fascinating to watch.

24. Haliastur girrenera Vieill.

This species occurs around the coasts of Northern and Eastern Australia, and New Guinea. The N.W. Cape and Monte Bello Islands are near the southern limit of its distribution on the west side of the continent. In the region of the Ashburton River it is not uncommon, and two pairs were observed upon the Monte Bello Islands, where they seem to subsist almost entirely upon small rock-crabs. On Trimouille one of these birds was observed to leave a heap of broken limbs and empty carapaces, which formed a pile more than a yard across upon a slab of rock in a large shallow cave to the east of the island. A nest containing similar remains was discovered amongst the mangroves on Hermite. It was placed in the fork of a *Bruguiera*, and was deep in form, about equal in size to that of a crow and composed of sticks, seaweed and *Spinifex*, with no distinct lining. It contained a single egg, dirty white in ground-colour, with scanty and minute streaks and sparks of rusty brown.

25. Pandion haliaëtus melvillensis. 373. Northern White-headed Osprey. (Pl. II.)

Mathews, Austral Avian Record, vol. i. p. 34, 1912; Melville I.

This Western Australian form of the almost cosmopolitan species occurs very abundantly, particularly frequenting the archipelago of flat rocks and islets lying to the north of the group, upon nearly every one of which there was a nest. The majority had laid early in June, but fresh eggs were obtained late in July and early in August. The nest is a conspicuous and bulky structure, ranging from about 11 inches to 5 feet in height, but always measuring about 3 ft. 6 in. in internal and about 5 feet in external diameter. It is composed of sticks, drift-wood, seaweed and bits of coral, etc., the shallow cavity being lined with finer seaweeds and any other soft material. Only one nest is ever found upon an island, though nests may be in close proximity if separated by water. When situated upon a low rock, the nest is usually four to five feet high and forms a conspicuous object. On the larger islands it is

generally a smaller structure, placed in some elevated position such as the top of a steep hill or a cliff overlooking the sea.

The eggs in nearly every case were three in number, one of which was often addled, creamy white in ground-colour, boldly blotched with deep reddish brown and underlying markings of purple-grey. Average measurements, 60×47 mm. The young when hatched are covered with grey down, and in their first plumage the head and breast are much streaked with brown.

The food, judging from remains found in the nest, consists mostly of sea-snakes and a sphyrænid fish, known locally as 'Pike,' which swims near the surface over the sandy shallows. In catching prey so slippery and narrow in girth, the conical and sharply pointed enlarged scales under the feet must be of especial service. As has often been observed in other localities, the prey is always carried lengthwise.

REPTILIA.

The following is a list of the Reptiles inhabiting the group. The nomenclature adopted is that of Boulenger, Brit. Mus. Cat. of Lizards, 1885, and Cat. of Snakes, 1893. I have to thank Mr. Boulenger for his kind assistance in identification.

1. Heteronota binoei Gray. (Pl. I. figs. 1–3.)

Gray, Cat. p. 159; Boulenger, B.M. Cat. vol. i. p. 151.

This species is distributed over Western Australia and the islands off the coast. On the Monte Bello Group it is very abundant, and the individuals are of large size and extremely variable in colour. It is nocturnal in habit, hiding by day under stones or pieces of wood, but at night it may be seen in numbers with the aid of a lantern, moving about rather sluggishly over the sand in search of the small beetles and spiders upon which it feeds.

2. Gehyra variegata, B.M. Cat. vol. i. p. 151.

Peripia variegata Gray, Cat. p. 159.

This little gecko is widely distributed over Australia and Polynesia, though most of the records are from the north and west of the continent. On the Monte Bello Islands, it occurs quite commonly on the sandy plains which are well clothed with scrub, hiding by day in the sand, and ascending the bushes at night in search of insects. Nearly all the examples were obtained at night upon stumps and posts which had been 'sugared' for moths, preying upon the insects as they alighted.

The specimens obtained, which are all from Hermite, are of small size, and show in every case four longitudinal rows of light spots down the dorsal surface, which are absent from the majority of examples examined from other localities. It is remarkable

that on Hermite this species and *H. binoei* bear a strong superficial resemblance to one another, both in size and coloration. The resemblance in size is perhaps the most remarkable, as the following figures will show :—

H. binoei: length, B.M. Catalogue, 80 mm.; Hermite specimens, 103 mm.

G. variegata: length, B.M. Catalogue, 147 mm.; Hermite specimens, 87 mm.

The discrepancy between the Monte Bello forms is largely accounted for by the long slender tail of *H. binoei*, the average measurements of the largest specimens from snout to base of tail being in the two cases, *H. binoei* 58·4 mm. and *G. variegata* 54 mm. Furthermore, it may be observed that the white spots on *G. variegata* correspond to some extent in position and appearance to the white tetrahedral scales on the back of *H. binoei*. The fact is interesting, as the two species are found together on the same ground, though the one obtains its food on the sand and the other on the bushes above.

3. Physignathus gilberti. (Pl. I. figs. 4–7.)

B. M. Cat. vol. i. p. 396.

Lophognathus gilberti Gray, Cat. p. 12.

This large and handsome lizard was seen very abundantly on Hermite Island, and occurs on nearly all the other islands. On warm and sunny days it could be seen almost anywhere, running and jumping with great agility over the rocks and trees, feeding mostly upon a large and abundant grasshopper, *Cyrtacanthacris guttulosa*.

The species is distributed over Northern and Western Australia. Montebello examples are greatly below the average size.

4. Ablepharus muelleri, B. M. Cat. vol. iii. p. 356.

Phaneropis muelleri Fisch., Arch. f. Nat. 1881, p. 236, pl. xii.

This lizard is probably common, for the regular waved track, formed by its burrowing through the surface sand, was frequently seen in the early morning, an indication that the species is nocturnal in its movements. Owing to the great rapidity with which it burrows, it is hard to capture, and our examples were obtained by turning over loose rocks in large numbers. It had previously been recorded only from Western Australia.

5. Lygosoma bipes, B. M. Cat. vol. iii. p. 337.

Rhodona bipes Fisch., Arch. f. Nat. 1882, p. 292, pl. xvii. figs. 10–15.

Apparently resembles in habit the preceding species, and obtained from the same locality in the same manner. It is apparently confined to N.W. Australia.

6. Lygosoma lesueurii, B. M. Cat. vol. iii. p. 225.

Hinula australis Gray, Cat. p. 77.
Tiliqua australis Gray, Ann. Nat. Hist. ii. 1838, p. 291.

This species is fairly abundant on all the larger islands, frequenting generally the limestone slopes of the hills, and during the heat of the day running about with great activity. Distributed over Western Australia.

7. Lygosoma isolepis, B. M. Cat. vol. iii. p. 234, pl. xv. fig. 1.

Hinula tenuis Gray, Cat. p. 76.

Rather common on the *Spinifex*-plains of Hermite. Diurnal, feeding upon flies and the smaller Orthoptera. Distributed over Western Australia.

8. Varanus gouldii, B. M. Cat. vol. ii. p. 320.

Monitor gouldii Gray, Cat. p. 12.

This large species, which occurs over Northern and Western Australia and New Guinea, is abundant over the whole Monte Bello Group, wherever there are flat sandy plains of sufficient extent. In places the ground is riddled with its flattened burrows, which usually descend to a depth of two feet or so, and ascend again to a second entrance, though they often branch and intersect. The reptile is only in evidence on very hot days, and is generally shy and wary, running with great rapidity. It feeds upon the larger Orthoptera, possibly also upon small birds. On the mainland in this vicinity it is known by the name of 'Bungarra,' derived from the aborigines, amongst whom it forms a source of food. It is supposed to do considerable damage to young chickens and eggs in settled localities.

9. Varanus acanthurus, B. M. Cat. vol. ii. p. 324.

Odatria ocellata Gray, Cat. p. 8.

This reptile is apparently scarce, for only one specimen was seen, being obtained on a *Spinifex*-plain of Hermite. On the mainland it is found over the north and west of the continent.

10. Typhlops ammodytes, sp. n. (Pl. I. figs. 8–10.)

Snout rounded and strongly projecting; nostril lateral. Rostral narrow, the upper portion nearly one-third the width of the head, not extending quite to the level of the eyes. Nostril between two nasals, the inferior of which comes just in contact with the lower portion of the præocular. Upper nasal nearly as broad as the rostral. Frontal small, præfrontal and parietals larger than the scales of the body. Eyes distinct. Four upper labials. 20 scales around the middle of the body. Tail slightly longer than broad, conical, ending in a short spine. Colour a uniform pale greyish brown, somewhat lighter on the under surface.

Length 230 mm. Diameter of body, 4 mm.

Found in the sand, under a loose rock, Hermite Island.

This species holds quite an isolated position. In most respects it approaches *T. braminis*, from which it is readily distinguished by the inferior nasal not extending to the upper surface of the head.

11. Liasis childreni Gray.

Gray, Zool. Miscell. 1842, p. 44; Cat. p. 93; Dum. & Bibr. Erp. Gén. vi. p. 439, 1844.

Only one specimen of this snake was seen and obtained. Apparently it is not common, though probably more in evidence in the very hot weather. It is distributed over Northern Australia to the islands in Torres Straits. I am aware of no previous record so far south as the Monte Bello Group.

From the above list, it will be seen that the reptilian fauna is typically North-West Australian, and it is quite possible that the new *Typhlops* will be found also to occur on Barrow Island and the mainland. With one or two exceptions, however, the island forms have undergone a marked reduction in size.

The following measurements of total lengths illustrate to what extent this reduction has taken place :—

	Brit. Mus. Cat.	Largest specimen obtained.
H. binoei	80 mm.	103 mm.
G. variegata	147 ,,	87 ,,
P. gilberti	468 ,,	370 ,,
A. muelleri.....	85 ,,	49 ,,
L. bipes	57 ,,	82 ,,
L. isolepis	198 ,,	143 ,,
V. gouldii.	1300 ,,	1070 ,,
V. acanthurus ..	665 ,,	69 ,,

INSECTA.

The collections of insects from the Monte Bello Islands are small. The islands were worked only during the dry months, when probably not one-third of the species were in the imago state, and it is probable that after the tropical rains very different results might have been obtained. On the other hand, the rainfall is so erratic that there are really no fixed seasons for emergence, and, the average temperature being high, a shower of rain in July may cause the emergence in small numbers of a species occurring abundantly after a heavy storm in October. To this cause I attribute the large percentage of odd examples, for showers occurred in April and in July, after a prolonged period of drought—the tropical rains of the previous season having failed. It is interesting to note, that with the common Pierid butterfly, *Belenois teutonia*, though the majority were of the dry-season form with the black on the margins of the wings reduced, about 20 per cent. were intermediate, and a few examples even approached the wet-season form. The collection, therefore,

may be more representative than might at first be supposed. In any case the number of species inhabiting the islands is likely to be small.

LEPIDOPTERA.

Rhopalocera.

Of butterflies frequenting the Monte Bello Islands there are eight species, the majority of which are common and widely distributed forms, though one, possibly two, of the Lycænids are distinct island forms. The specimens have been compared with forms in the British Museum.

1. Belenois teutonia Fabr.

Belenois java Waterhouse, Cat. Rhop. of Australia, no. 1 memoir, N.S.W. Naturalists' Club, 1903.

A well-known Austro-Malayan species, very abundant.

2. Precis vellida (Fabr.).

One example of this widely-distributed and rather variable butterfly.

3. Vanessa kershawi McCoy.

Another widely-distributed form, the Australian representative of the familiar *V. cardui*. In the Monte Bello examples, the fifth (anterior) spot on the under surface of the hind wing is much reduced or absent. Though in this respect the Monte Bello series is uniform, yet these spots are generally somewhat variable, and no systematic distinction can be made.

4. Danais chrysippus Linn., form *petilia* (Stoll).

An Austro-Malayan form, not uncommon on Hermite.

5. Neolucia serpentata H.-Sch.

The Monte Bello series is again very uniform, and differ from most examples in having only one ocellus at the hind margin of the lower surface of the hind wing. The general coloration of the lower surface is brighter than in specimens from East and South Australia, and less bright and distinct than in specimens from Port Darwin and the tropical North. It is identical with specimens from Wallaby Island in the British Museum collection, and is possibly an island form. Very common over the whole group.

6. Nacaduba biocellata Felder.

This butterfly extends over Western Australia, being particularly abundant on the islands off the north-west coast. The sets obtained on Hermite, Long and Trimouille Islands are identical with examples from Queen's Islet, N.W.A. The species was very abundant from June to the end of July, frequenting the flowers of *Myoporum*.

7. Holochila heathii aerata, subsp. n.

This is a common Monte Bello form of *H. heathii* Cox. It is somewhat smaller, and the male shows a bronze rather than a purple sheen upon the upper surface of the wings, and is of generally darker coloration. In the female, the blue on the upper surface of the fore wings is much reduced, in some examples being confined to the base of the interspace between the first and second veins. Both sexes have six very distinct marginal spots upon the lower surface of the fore and hind wings, in this respect resembling the type and differing from examples from the south-west and central parts of Western Australia, in which these spots are generally indistinct and sometimes absent.

8. Oxytoxia argenteo-ornatus Hew.

A large series, mostly from Hermite.

Heterocera.

It is by no means sure that the majority of species in the following list are not accidental visitors to the islands. By far the greater number of the Noctuæ were taken upon sugar on one or two evenings, notably June 20th and from June the 29th to the first few days of July, 1912. Though sugar was applied almost every evening throughout our three months' visit, yet it was only upon these few occasions that moths were taken. The nights in question were warm and still, following upon periods of strong easterly and south-easterly winds, which had blown for several days in succession. It would not be surprising that winds of this nature, which several times enveloped the islands in clouds of dust from the deserts of the mainland, should bring with them winged insects capable of fairly prolonged flight. There are, however, several forms which are apparently new, two of which are described here. Other apparently new species require comparison with type-specimens in Australia. As the N.W. Australian fauna is at present but little known, it would be unsafe to base any zoo-geographical conclusions upon insects so easily transported.

1. Amsacta marginata Donov.

Three examples, similar to specimens in the British Museum from the Sherlock River district, including a yellow-bodied aberration, which is also identical in every respect. In the red-bodied specimens, the black spots on the margins of the hind wings are much reduced, whereas in the yellow-bodied specimen they are very prominent.

2. Utetheisa pulchelloides Hamps.

Identical with specimens from Port Darwin and Baudin Island.

3. Euproctis chionitis Turner.

A very abundant species distributed over most of Australia

4. Anthela Walk. (*Darala* Walk.) pudica Swinh.

A somewhat dark form of this West Australian species.

5. Collusa sp. ? near *C. flavala.*

6. Euxoa radians.

Distributed all over Australia.

7. Chloridea armigera Hübn.

Agrees with specimens from North Australia, in which the orbital stigma is nearly obsolete.

8. Neocleptria punctifera Walk.

Distributed over Northern and Western Australia.

9. Melicleptria neurias Meyr.

Agrees with the light West Australian form from the Sherlock River.

10. Melicleptria albivenata, sp. n. (Pl. I. fig. 11.)

Head and thorax light brown ; abdomen white below, yellowish above. Fore wings yellowish brown, the veins white, narrowly bordered on each side with dark brown. In some specimens, the wing more or less diffused with scattered white scales, with the exception of the discoidal cell, which stands out rather clearly, and the region near the outer margin. A terminal series of dark points, but often indistinct. Hind wings white, suffused with brown except upon the terminal and costal areas. Expanse, 27 mm.

In general appearance resembles *M. canusina* Swinh. (Hamps., B.M. Cat. vol. iv. p. 99) from the Sherlock River district, but distinguished by the white nervures and suffusion.

Taken on sugar, Hermite, July 1912.

11. Propatria mundoides Lower.

Widely distributed upon the mainland of Australia.

12. Ectopatria aspera Walk.

Distributed over Australia and New Zealand.

13. Pandesma submurina Walk.

Australia and New Guinea.

14. Grammodes ocellata Tepper.

Two typical examples. Distributed over Australia.

15. Gonitis subulifera Guen.

A few examples of this almost cosmopolitan species.

16. Anumeta zuboides, sp. n. (Pl. I. fig. 12.)

This may prove to be merely a form of *Anumeta zuba* Swinh., to which in any case it is very closely allied. Compared with specimens in the British Museum, the following distinctions are readily observed: somewhat larger in size; the white line across the fore wings in the majority of specimens much more distinct, waved instead of straight; hind wings darker in colour. Expanse, 30 mm.

The specimens were taken on sugar, Hermite, July 1912.

17. Cirphis abdominalis Walk.

Recorded from North Australia. Hermite, scarce.

18. Amyna octo Guen.

Widely distributed, occurring from India to the New Hebrides.

19. Amyna spilonota Lower.

A North Australian species, recorded from Port Darwin.

20. Eublemma dubia Butler.

Distributed over the greater part of the Australian continent.

21. Polydesma lawsoni Feld.

Western Australia. Specimens identical with examples from the Sherlock River.

22. Polydesma marmarinopa.

Also identical with specimens from the Sherlock River.

COLEOPTERA.

The following very meagre *provisional* list comprises all the beetles found upon the islands, although considerable pains were taken in their collection. Searching the sand and vegetation at night by the aid of a lantern yielded the best results, but there can be few species and those by no means abundant. Of these three appear to be new, but they are not now described, as many type-specimens of West Australian species have not been examined. The list will serve at least to show the type of the fauna.

1. *Trox crotchi* Har. Hermite.
2. *Isodon novitius* Blackb. Hermite.
3. *Coccinella transversalis* Fabr. Hermite.
4. *Dermestes cadavorinus* Fabr. From a dead Cat.
5. *Gonocephalum meyricki* Blackb. Hermite.
6. *Sympetes*, (?) sp. n. Hermite.
7. *Saragus*, (?) sp. n. Hermite.
8. *Mictotragus arachne* Pascoe. All islands.
9. *Phorocantha*, (?) *senio* Newm. Hermite.
10. *Symphyletes*, (?) sp. n. Hermite.
11. *Bostrychopsis jesuitus* Fabr. All islands.

ORTHOPTERA.

The Orthoptera, as is usually the case in warm and arid localities, comprise a large and characteristic section of the insect fauna of the Monte Bello Islands. There are few species, but of those that do occur, some are extremely abundant. The larger winged species are mostly of wide distribution, but the smaller wingless forms comprise several undescribed (?) species.

The acridiids include such forms as the large *Cyrtacanthus guttulosa*, which occurs in great numbers upon all the islands, forming the main food-supply of the larger Reptiles. This insect is capable of prolonged flight, though it is only upon rare occasions that it exerts this faculty, and then can be observed flying in swarms through the *Spinifex*, usually about sunset. The 'Blue-winged Locust,' *Coryphistes cyanopterus* Charpentier, also occurred but the examples were mostly of small size. The species is of wide distribution. Another large form, *Acridium maculicollis*, was also recorded, though it was not common.

Of the mantids, only two were met with in numbers, *Archimantis brunneriana* Sauss., a North Australian species, and a smaller species of the genus *Orthoderides*, near *O. ministralis* Fabr., but as yet undetermined. This insect was always found upon the foliage of *Myoporum acuminatum*, the leaves of which it closely assimilates both in form and colour.

Three species of cockroach were obtained, two of them identical with, or closely allied to, *Periplaneta concolor* Walk. and *Ellipsidron inquinata* Walk., and the third apparently a new species of the genus *Polyzosteria*. One female phasmid was also obtained, clearly a form of or closely allied to *Hyrtacus entrachelia* (Westwood).

HYMENOPTERA.

The species of Hymenoptera from N.W. Australia are little known. Consequently any geographical conclusions based on collections from Monte Bello are likely to be erroneous. The following is a *provisional* list showing the type of the fauna, but the ants have been omitted.

1. Paracolletes perfasciatus Cock.

This species has been identified by Mr. G. Meade-Waldo, British Museum, who contributes the following note.

"The type of this species, described by Cockerell (Ann. Mag. Nat. Hist. (7) xvii. p. 25, 1906) from a specimen in very poor condition, has 'Western Australia' as its only locality. It may be useful to give a few remarks on the pubescence, which is much spoiled by wetting in the type. For structure, Cockerell's description is excellent. The thorax in fine fresh specimens is densely clothed with brownish-buff pubescence, thickly inter-

mingled with black hairs; the median segment is clothed with whitish pubescence on the surface of the truncation, and the scopa on the posterior tibiæ and tarsi is composed of long and dense white hairs. Two females collected on Hermite Island, July 1912."

2. Nomia flaviviridis, subsp. *doddi*, Cock.

Also identified by Mr. Meade-Waldo. Another W. Australian species.

3. *Epactrothynnus productus* Turner. Hermite.
4. *Thynnus*, (?) sp. n. Hermite.
5. *Bembex*, (?) *variabilis* Sm. Hermite.
6. *Sphex australis* Sauss. Hermite.
7. *Trachysphex*, (?) *pilosulus* Turner.
8. *Salius tuberculatus* Sm. Hermite.
9. *Aporus cingulatus* Fabr.
10. *Aporus*, (?) sp. n. Hermite.
11. *Ephutomorpha morosa* Westw. Hermite.
12. *Ephutomorpha modesta* Smith. Hermite, Trimouille.
13. *Henicospilus* sp.?

Of other insects the Hemiptera were not well represented, the majority of forms being Homoptera. Two species of water-bugs were obtained from the Home Lagoon, Hermite, one closely resembling *Hermatobatodes marchei* Coutière et Martin (Bull. Mus. Hist. Nat. Paris, vii. 1907, p. 214) and the other *Halobates wulterstorfii* (Frauenf.)*; both appear to have points of specific difference.

MYRIAPODA.

Identified by Professor K. Kraepelin.

The species are all forms found upon the West Australian mainland, though one is apparently an insular variety. The specimens were largely collected from under stones during the daytime, but some were found running about in the sand by the aid of a lantern at night.

1. Rhombocephalus lætus Haase.

Scolopendra læta Haase, Abh. Mus. Dresden, No. 5, p. 51, pl. iii. fig. 51 (1887).

Recorded from Western Australia and New South Wales. Fairly numerous on Hermite.

2. Rhombocephalus morsitans (Linn.).

(*Scolopendra morsitans* Linn.)

Probably imported from Asia by way of the mainland, where it is now established. The species is now almost universally distributed in the warmer parts of the world.

* *Cfr.* F. B. White. 'Challenger' Report, p. 40.

3. Cormocephalus turneri Pocock.

Pocock, Annals & Mag. Nat. Hist., 7th Series, vol. viii. p. 456 (1901).

Three examples, taken on Hermite, differ from the type from Perth, Western Australia, in that the last tergum has a distinct median groove, which is lacking in the mainland form.

4. Asanadopsis mjöbergi Kraepelin.

At the time of writing, Professor Kraepelin's description of this species, which was sent to him by Dr. Mjöberg from North-Western Australia, was not yet published. Professor Kraepelin considers this second example from Hermite to be identical, though he could not be absolutely certain, for he had sent back the type and was consequently unable to compare the two.

One species of scorpion was obtained on Hermite. It is identified by Dr. Kraepelin as *Lychas variatus* Thor.

PISCES.

The following fishes are inhabitants of the tidal lagoons. They have been identified by Mr. C. Tate Regan.

1. *Orectolobus tentaculatus* Peters.
2. *Rhinobatus armatus* Gray.
3. *Muræna thyrsoidea* Richards.
4. *Plotosus anguillaris* Bloch.
5. *Chæroichthys valenciennei* Kaup.
6. *Pseudochromis fuscus* Müller & Trosch.
7. *Valenciennea longipinnis* Benn.
8. *Gobius phalæna* Cuv. & Val.
9. *Opsanus diemensis* Lesueur.

Summary and Conclusions.

In considering the relation between these islands and the mainland, a feature of primary importance is the extreme shallowness of the sea between them and the mainland, in all probability indicating a separation of comparatively recent date. The invertebrate fauna of Barrow Island is unfortunately little known. The identity of the Wallaby, *Lagorchestes conspicillatus*, and the Bandicoot, *Isoodon barrowensis*, support the theory that Barrow and the Monte Bello Group were continuous long after their separation from the mainland.

The fauna, however, is not typical *North*-West Australian, such as is met with in the Ashburton district, but comprises many Northern and South-Western forms. There are, furthermore, few species, and these are of mixed distribution. Many characteristic North-Western forms are entirely absent, though a high percentage of those species not easily transported (such as the Reptiles and Chilopoda) are identical with, or slightly modified representatives of, the species occurring in the immediate vicinity upon the mainland. Mr. Hogg, in dealing with the spiders, has

pointed out the absence from the collections of several species so widely spread as to be generally found in any locality in Australia. He suggests, therefore, that the islands have once been largely denuded of the original spider fauna, and were repopulated subsequently with other species. These seem mostly to have come from the south-west by the trade-wind course, for the majority could certainly have been wind-borne. These remarks in some measure seem to apply to other groups of animals, though many species are northern, occurring in Queensland and the Northern Territory, probably having come down by the hurricane course.

That an almost complete depopulation of the islands could have occurred is by no means an improbability, when their small size and the prevailing meteorological conditions are considered. It will be noted that the vast majority of the specimens recorded are from Hermite. This island was certainly the most thoroughly worked, though the others were frequently visited, but its fauna was at least three times as large as that of any of the smaller islands. This is merely a demonstration of the obvious fact that the smaller the island, the less will be the chance of a sufficient number of individuals surviving to perpetuate the species after a particularly severe and prolonged period of drought. It is indeed remarkable that the Wallaby has been able to survive, considering that it lives entirely in the open, and has nowhere to shelter except amongst the *Spinifex* during the hurricanes, when trees and bushes are torn up by their roots, and sand and shells blown about with such violence as to cut deeply into wood.

In considering this point, it is well to remember that little work has been done in the North-West of Australia, and the distribution of some species may be found to be much more extended than is at present supposed. Moreover, other forms, which might be looked upon as island species, may really be quite common on the mainland, though as yet unrecorded. However, the well-known generalisations with regard to island faunas (using the word 'island' in the zoological sense) hold good:—the wingless forms not easily transported comprise most of the undescribed forms, being in many instances clearly the modified representatives of mainland species, whereas the easily transported winged species are for the most part of wide distribution. There are many anomalies, which can only be explained by considering individually the habits of each species and the prevailing meteorological conditions. Amongst the Longicorn beetles, for example, there are two abundant species, of which one, *Mictotragus arachne*, has the elytra completely fused, and is absolutely identical with the form occurring abundantly upon the mainland opposite. The other, *Symphyletes*, sp. n. (?), a form with well-developed wings, is confined to Hermite. A possible factor in such local distributions is perhaps to be looked for in the whirlwinds which are a characteristic weather-feature of the district. These disturbances can be observed almost any day, and must certainly be regarded as an important distributing factor. Of the two beetles in question, the

Mictotragus is almost invariably found walking about freely upon the surface of the sand, and has an extremely thick and hard cuticle, being therefore well adapted for wind transportation. The *Symphyletes*, on the other hand, was only found upon its particular plant, *Tricholesma zeylanicum* R. Br., clinging to the stems just below the clusters of flowers and buds, from which it was not easily dislodged.

Of the birds, one new subspecies, *Eremiornis carteri assimilis*, is a bird of very weak flight, seldom fluttering more than a few yards at a stretch, and taking shelter in the densest thickets. It is therefore not surprising that it should differ from its mainland representative. In the subspecies of *Anthus australis*, however, the case is different, for it is a bird of powerful flight, often observed crossing the passages between islands, and inhabiting the open plains. It is suprising that this bird should exhibit even more marked differences from the mainland form than the last-named.

EXPLANATION OF THE PLATES.

Plate I.

Heteronota binoei.

Figs. 1, 2. Showing variation in markings.
3. Individual with regenerating tail.

Physignathus gilberti.

4. Male, nat. size.
5. Under surface of head, showing general outline and gular fold.
6. Female, nat. size.
7. Under surface of head of female.

Typhlops ammodytes, sp. n.

8. Head, dorsal view.
9. Head, ventral view.
10. Tail, ventral view.

11. *Melicleptria albivenata*, sp. n., nat. size.

12. *Anumeta zuboides*, sp. n.

Plate II.

Young *Pandion haliaëtus melvillensis* in nest.

Plate III.

Nest and young of *Haliaëtus leucogaster*.

Plate IV.

Home Lagoon and Vegetation of Hermite Island.